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G T - 4 X L

- **GPS 信号转发系统说明书**
- **安装指导和使用指南**

设备原厂商：*GPS SOURCE INC*

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1. 功能描述

GT-4XL主要功能是将卫星信号从室外引到室内或其它收不到卫星信号的地方，能在室内用普通的卫星接收机接收到卫星信号，在室内即可完成应在室外完成的各项工作，为GPS接收机提供可调整的测试信号。

GT-4XL是一款双频双系统信号转发器，可对 GPS+GLONASS 信号进行转发。在采用双星天线后，天线接口可实现单输入——单输出模式，减少了馈线的数量，使转发器实现功能的同时，仍维持其小功耗特性。同时也可以对双频信号进行转发，为需要测试双频接收机的客户解决了无法在室内测试的难题。

功能特性

- 频率范围：GPS L1 （可选配其它的GPS天线，获得更多频段的信号转发）
- 供电：220V交流。
- 覆盖距离：10M～75M
- 配置1， 系统增益可调： 0dB ~ 30dB 可调。
- 配置2， 系统增益可调： -15dB ~ 40dB 精确控制增益（1dB 步进）。

GT-4XL具有良好的扩展性能，可以根据客户的具体要求，比如信号覆盖面积，信号的强度做相应的调整。该系统可以通过选配各种配件来满足需求。可选配件有：

- GPS splitter : S12,S14,S18,RMS18,RMS16,RMS32
- GPS line amplifier:20dB, 30dB,40dB
- GPS attenuator: fixed attenuator, 0~40dB variable attenuator etc.
- GPS repeater horn.
- GPS DC block
- Cable assembly

更多的可选的配件可以登陆我公司网站：www.gpssource.com.cn ,或联系我们 sales@gpssource.com.cn ，或拨打我们的技术服务热线：86-755-29644311。

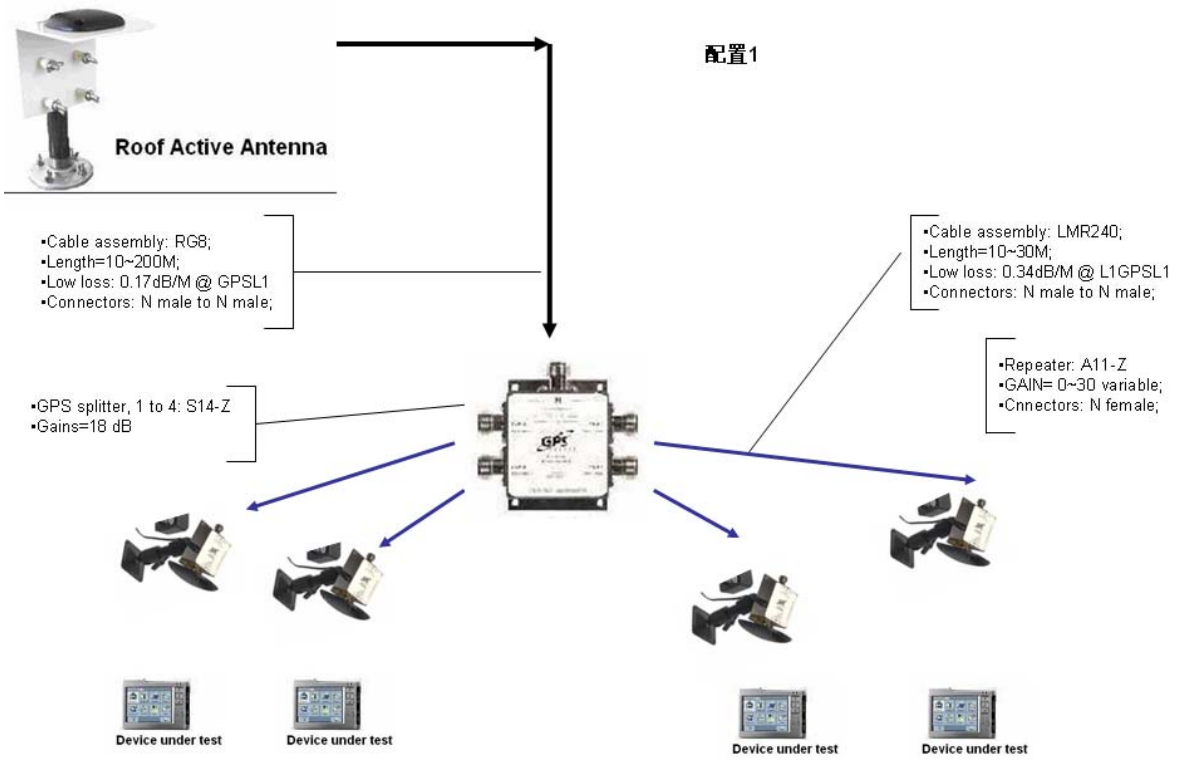
2. 应用

- **GPS接收机产品的测试**
  GPS产品生产线、GPS手机生产线、GPS实验室、大学实验室、等需要对产品进行测试、产品性能验证等应用环境。

- **GPS信号的室内覆盖**
  需要实现GPS信号的室内覆盖的各种场合：航空制造、航空维修、实验室、大厦停车场、GPS卖场、室内演示厅等。

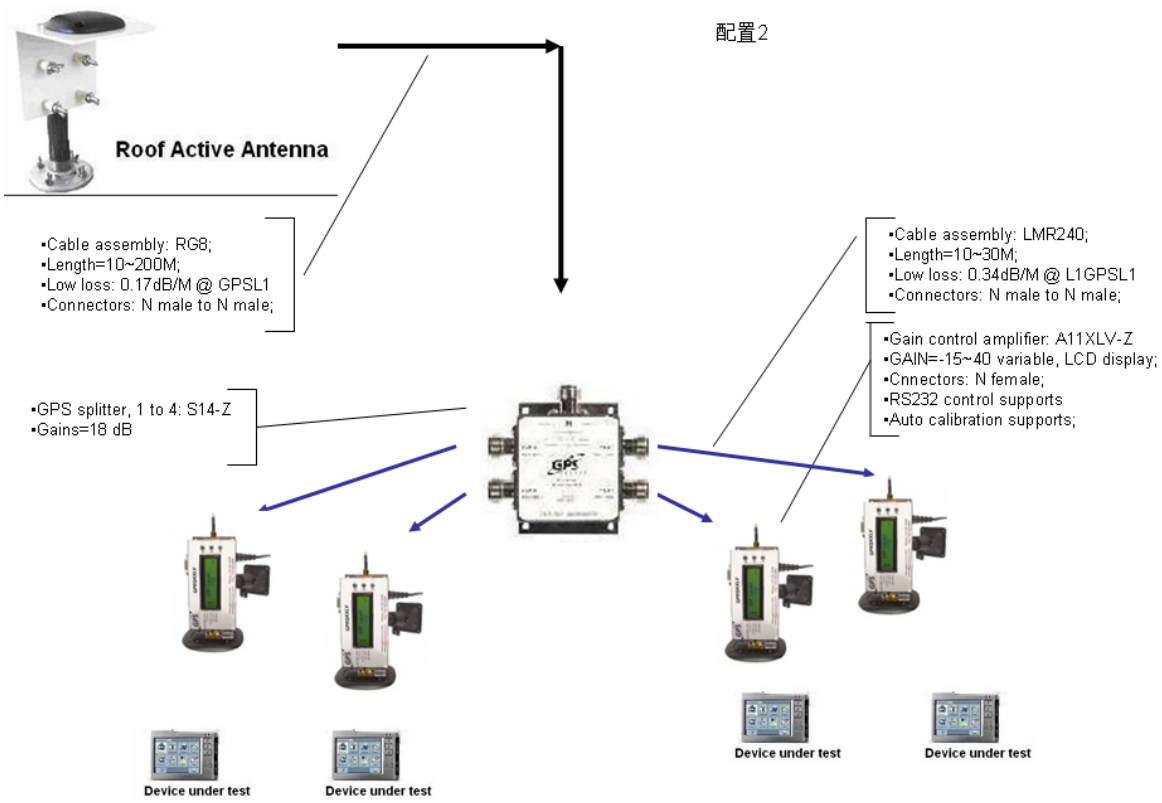
3. 系统结构

3.1 配置 1



图表 1

3.2 配置 2



图表 2

4. 组成部件

4.1 配置 1

1. 室外接收天线 L1A（1 个）
2. GPS转发器：A11-Z （1~4个）
3. GPS功分器：S14-Z （1个）
4. 电缆： RG8/LMR400，长度 10-200 米， NM 连接器
5. 电缆： LMR240 ，长度<= 50 米， NM 连接器
6. 避雷器（N-MALE + N-FEMALE）， 1 个。
7. 工程配件：
   天线底座、走线管、热缩套管等。

4.2 配置 2

1. 室外接收天线 L1A（1 个）
2. GPS转发器：A11XLV-Z （1~4个）
3. GPS功分器：S14-Z （1个）

4．电缆： RG8/LMR400，长度 10-200 米， NM 连接器
5．电缆： LMR240 ，长度<= 50 米， NM 连接器
6．避雷器（N-MALE + N-FEMALE）， 1 个。
7．工程配件：
天线底座、走线管、热缩套管等。

5. 技术指标

5.1 A11-Z

Electrical Specifications, Operating Temperature -40 to 85°C

Parameter		Conditions	Min	Typ	Max	Units
Freq. Range		IN – OUT, IN/OUT-50Ω	1		2	GHz
In/Out Imped.		IN, OUT		50		Ω
Gain 1227MHz 1575MHz		IN – OUT, IN/OUT-50Ω	 30 30	 32 32	 33 33	dB
Variable Gain Opt. 1227MHz: Max Gain Min Gain: 1575MHz Max Gain Min Gain:		IN – OUT, IN/OUT-50Ω	 28 -4 28 -2	 30 -3 30 0	 32 -1 32 1	dB
Input SWR		OUT Port - 50Ω			2.0:1	-
Output SWR		IN Port - 50Ω			2.0:1	-
Noise Figure[4]		IN – OUT, IN/OUT-50Ω			1.8	dB
Gain Flatness		|L1 – L2|, IN – OUT, IN/OUT-50Ω			2	dB
Group Delay Flatness		$\tau_{d,max} - \tau_{d,min}$, IN – OUT			1	ns
Reverse Isolation		OUT –IN	30			dB
AC IN	110	Wall Mount Transformer[3]		110		VAC
	220/240	Wall Mount Transformer (Various Intl. plug types available)[3]		230		VAC
DC IN	Pass DC	Non-Powered Configuration, DC Input on OUT port	3		16	VDC
	Powered	Powered, Mil. Conn. Or Quick Connect Option	3[1]		28[2]	VDC
Device Current		Current Consumption of device, excludes Ant. Cur.			16	mA
Ant/Thru Current	Pass DC	Non-Powered Configuration, DC Input on OUT port			250	mA
	Powered	Powered, Mil. Conn. Or Quick Connect Option			Note 3	mA
Max RF Input		Max RF input without damage			10	dBm

Notes:

1. DC IN for powered option must be 2V greater than desired DC Voltage Out
2. Maximum DC IN is 35V when 1275B Powered option is included
3. Maximum combined DC current draw out all ports of the device is a function of the DC input voltage and desired DC output voltage , according to the following:

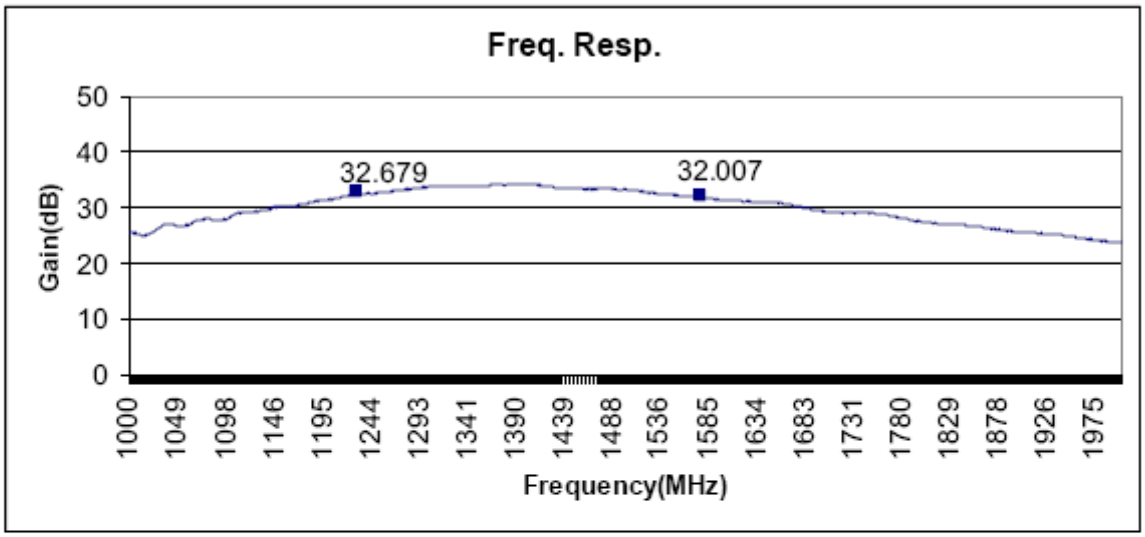
$$Iout \leq 1.4 / (V_{DC\,IN} - V_{DC\,OUT}) - 0.007 \quad Amps$$

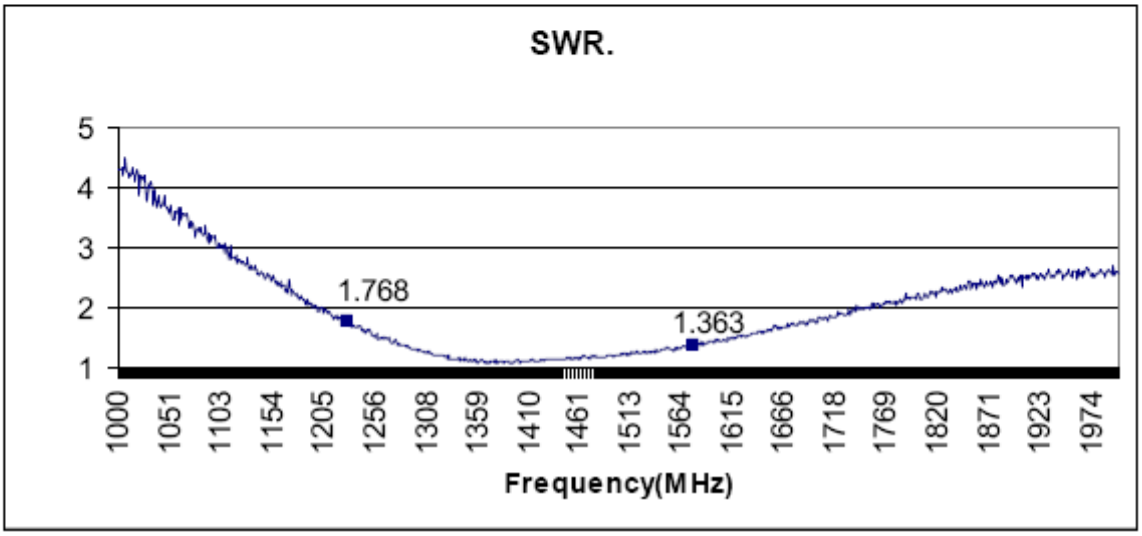
For powered option with a wall mount transformer (Voltage Input = 110/220/240 VAC), $V_{DC\,IN}$ is 9V.

4. Does not apply to variable gain option at any setting other than max gain

Performance Data:

A11 Amplifier





5.2 A11XLV-Z

Electrical Specifications, Operating Temperature -20 to 65°C

Parameter	Conditions	Min	Typ	Max	Units
Freq. Range:	IN – OUT, IN/OUT-50Ω	1200		1700	MHz
Gain[1] 1575MHz -Max. Gain Setting -Min. Gain Setting 1227MHz -Max. Gain Setting -Min. Gain Setting	IN – OUT (Tx Ant.)	 39 -18 38.5 -16	 40 -15 40 -15	 41 -14 41.5 -12	 dB
L1 Filtered Opt 1575MHz -Max. Gain Setting -Min. Gain Setting +/- 50MHz[2] +/- 100MHz[2] +/- 300MHz[2] 1227MHz	IN – OUT, IN/OUT-50Ω;	 38 -16.5 5 20 40 40	 39 -15	 41 -13.5	 dB
L1\L2 Filtered Opt 1575MHz -Max. Gain Setting -Min. Gain Setting +/- 50MHz[2] +/- 100MHz[2] + 300MHz[2] 1227MHz -Max. Gain Setting -Min. Gain Setting +/- 50MHz[2] +/- 75MHz[2] - 300MHz[2]	IN – OUT, IN/OUT-50Ω;	 38 -16.5 5 12 40 38 -16.5 5 12 45	 39 -15 39 -15	 41 -13.5 41 -13.0	 dB
Input 1dB Comp.	IN – OUT, IN/OUT-50Ω	-55			dBm
Input IP_3	IN – OUT, IN/OUT-50Ω	-43			dBm
Input/Output Imped.	IN, OUT Port		50		Ω
In/Out SWR[1]	Input, Output Port 50Ω			2.0:1	-
Gain Flatness[1,3]	|L1 – L2|, IN – OUT, IN/OUT-50Ω			2.5	dB
Noise Figure	IN- OUT, IN/OUT -50Ω; Max. Signal Setting			2.5	dB
DC IN	DC Input from wall mount transformer, or quick disconnects Optional DC input on IN Port:	8 6	9	16 16	VDC VDC

Parameter		Conditions	Min	Typ	Max	Units
Current		Amplifier Current Draw, DC Input			180	mA
Antenna Monitor [4]	I_{OC}	Range for Open Circuit Threshold	15		75	mA
	I_{SC}	Range for Short Circuit Threshold[5]	100		125	
Current (Iout)		Antenna Current Draw, DC output to Ant VDC In = 9V			70	mA

Notes:

1. Performance guaranteed for N(F) connectors.
2. Relative to the passband.
3. Non-Filtered.
4. Open Circuit & Short Circuit Current (I_{OC}, I_{SC}) may be set by the customer within the specified range

Performance Data:

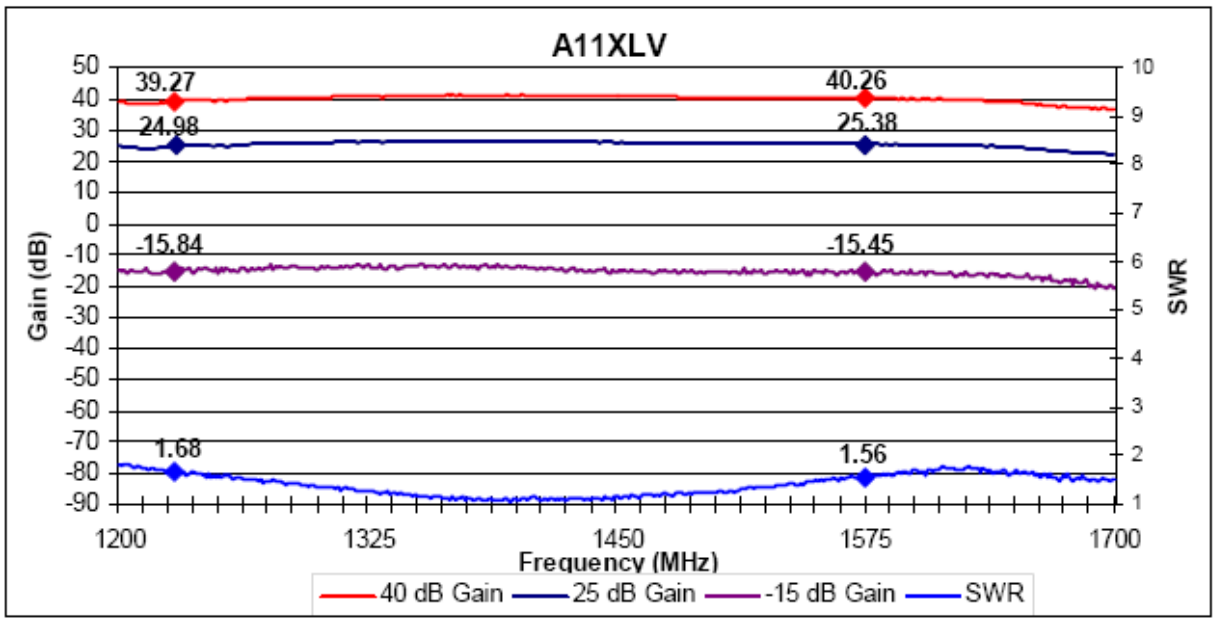


Figure 1. A11XLV Non-filtered Frequency Response

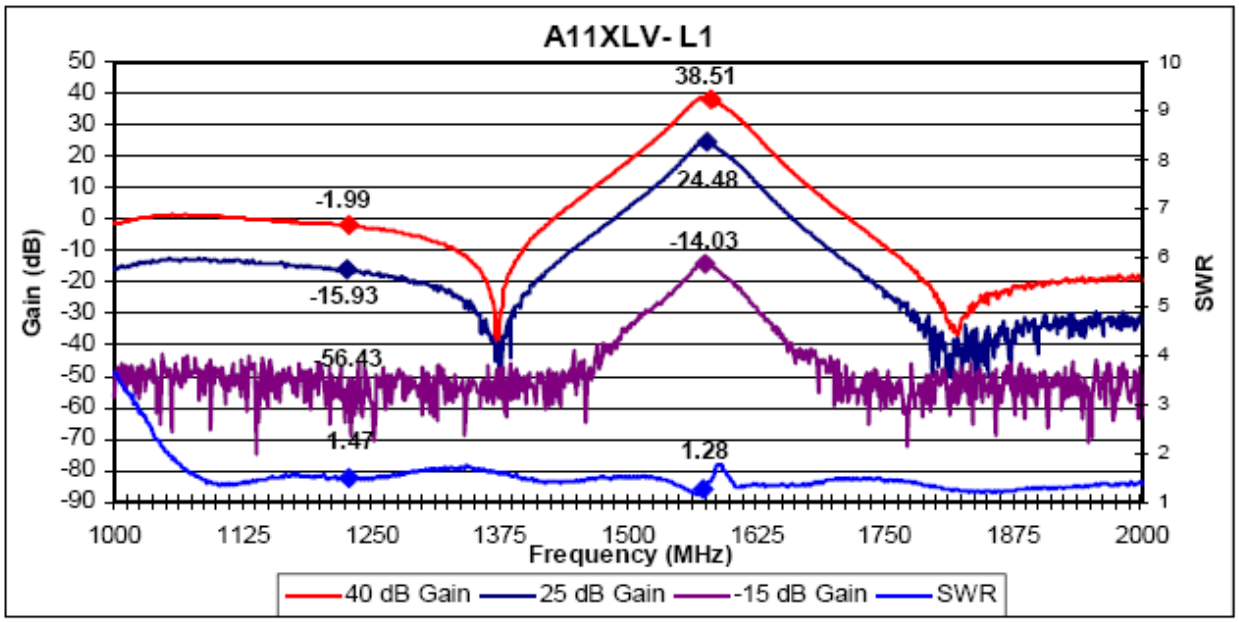


Figure 2. A11XLV L1 Filtered Frequency Response

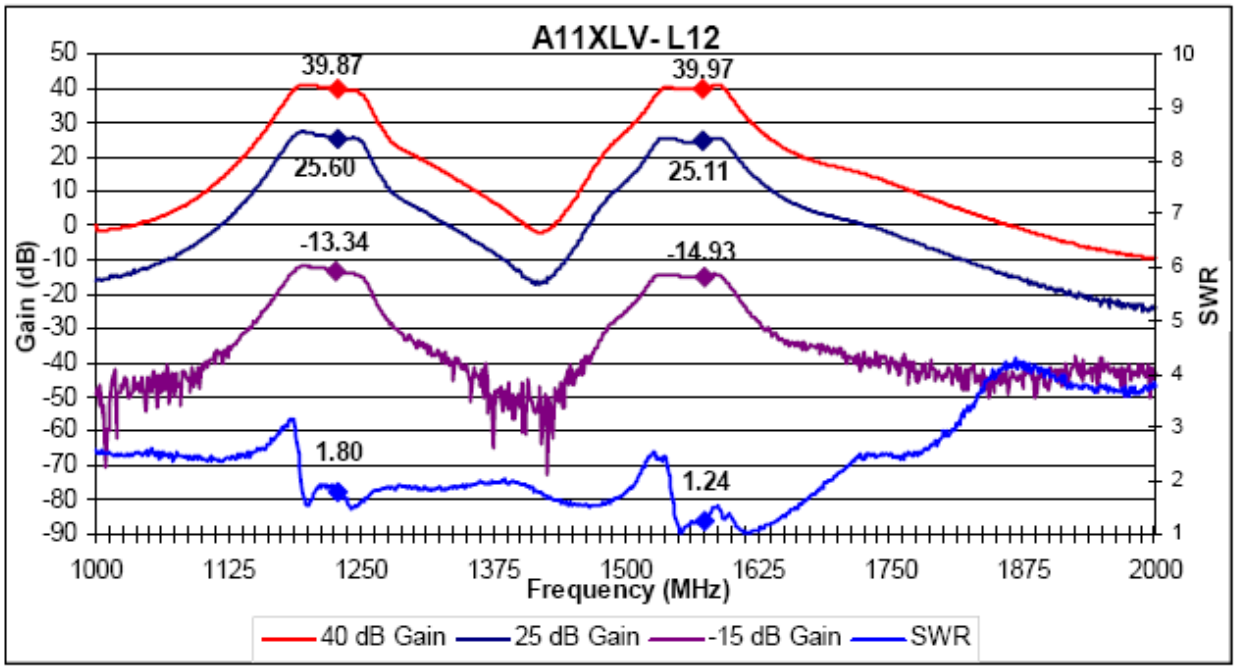
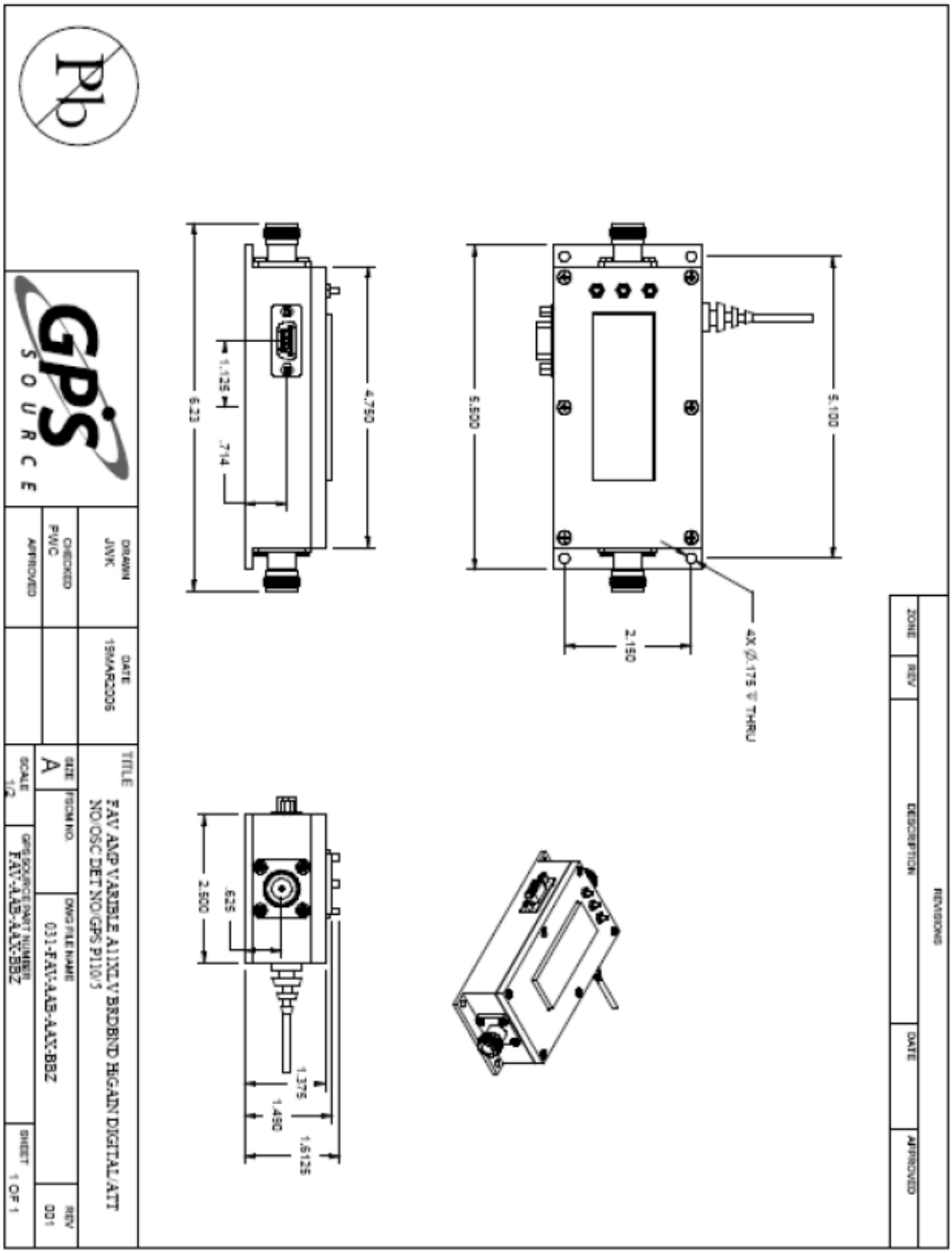


Figure 3. L1/L2 Filtered Frequency Response

Mechanical:



5.3 S14 -Z

Electrical Specifications, Operating Temperature -40 to 85 C

Parameter		Conditions	Min	Typ	Max	Units
Freq. Range		Ant – Any Port, Unused Ports - 50 Ω	1		2	GHz
In/Out Imped.		Ant, J1, J2, J3, J4		50		Ω
Gain[4][5]		Ant – Any Port, Unused Ports - 50 Ω				dB
-Amplified (Norm)			20	21	22	
-Amplified (Cust Gain)		As Specified (XdB)	X-1	X	X+1	
Loss-Passive[5]		Ant – Any Port, Unused Ports - 50 Ω	6.5	7.5	8.5	dB
Input SWR[5]		All Ports 50Ω			2.0:1	-
Output SWR[5]		All Ports 50Ω			2.0:1	-
1dB Comp. Pt. (Ampl.)		All Ports 50Ω		-32		dBm
Input IP_3 (Ampl.)		All Ports 50Ω		-24		dBm
Noise Figure-Amplified		Ant – Any Port, Unused Ports - 50 Ω			1.8	dB
Gain Flatness[5]		|L1 - L2|, Ant – Any Port, Unused Ports - 50 Ω				dB
-Amplified:					2	
-Passive:					1	
Amp. Balance		|J1 - J2|, Ant – Any Port, Unused Ports - 50 Ω			0.5	dB
Phase Balance		Phase (J1 - J2), Ant – Any Port, Unused Ports - 50 Ω			1.0	deg
Group Delay Flatness		$\tau_{d,max} - \tau_{d,min}$, Ant – Any Port			1	ns
Isolation						
-Amp/Pass (Norm)		Adjacent Ports: Ant - 50Ω	13			dB
		Opposite Ports: Ant - 50Ω	21			dB
-Amplified (Hi Iso.)		Adjacent Ports: Ant - 50Ω	30			dB
		Opposite Ports: Ant - 50Ω	40			dB
AC IN	110	Wall Mount Transformer[3]		110		VAC
	220/240	Wall Mount Transformer (Various Intl. plug types available)[3]		230		VAC
DC IN	DC Blk	Any DC Blocked Port with a 200 Ω Load			14	VDC
	Pass DC -Amplified -Passive	Non-Powered Configuration, DC Input on J1	3		16 16	VDC
	Powered	Powered, Mil. Conn. or Quick Connect Option	3[1]		28[2]	VDC
Device Current		Current Consumption of device, excludes Ant. Cur.			16	mA
Ant/Thru Current	Pass DC	Non-Powered Configuration, DC Input on J1			250	mA
	Powered	Powered, Mil. Conn. or Quick Connect Option			Note 3	mA
Max RF Input		Max RF input without damage				dBm
-Amplified					0	
-Passive					30	

Notes:

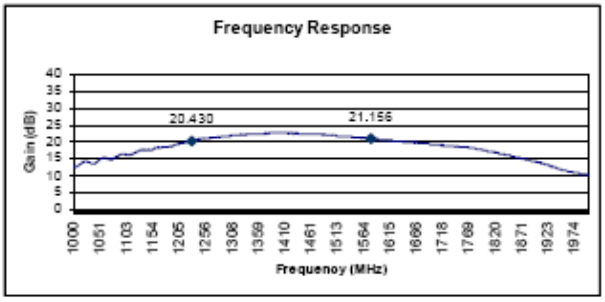
1. DC IN for powered option must be 2V greater than desired DC Voltage Out
2. Maximum DC IN is 35V when 1275B Powered option is included
3. Maximum combined DC current draw out all ports of the device is a function of the DC input voltage and desired DC output voltage , according to the following:

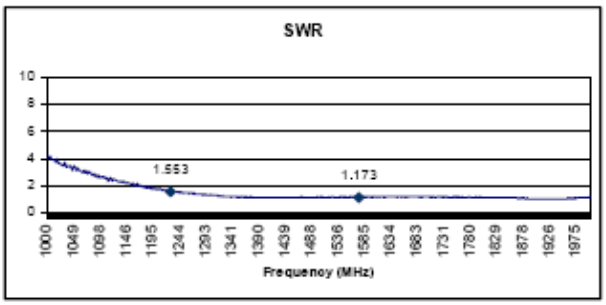
   $$Iout \leq 1.4 / (V_{DC\,IN} - V_{DC\,OUT}) - 0.016 \quad Amps$$

   For powered option with a wall mount transformer (Voltage Input = 110/220/240 VAC), $V_{DC\,IN}$ is 9V.
4. Choose Custom Gain Option for improved port-to-port isolation
5. Performance guaranteed for N(F) connectors

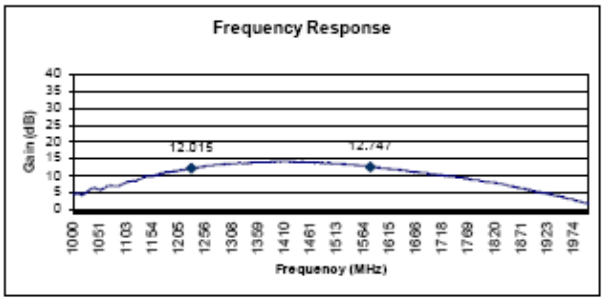
Performance Data:

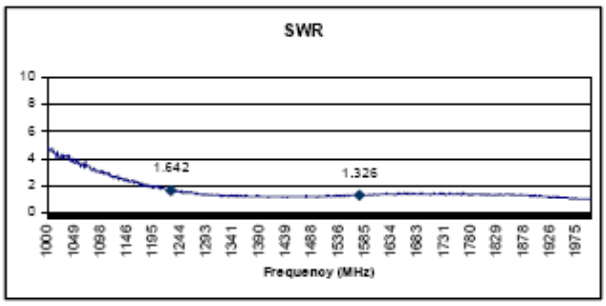
S14 Active – Normal

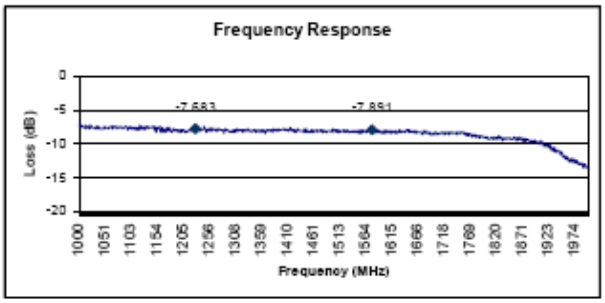


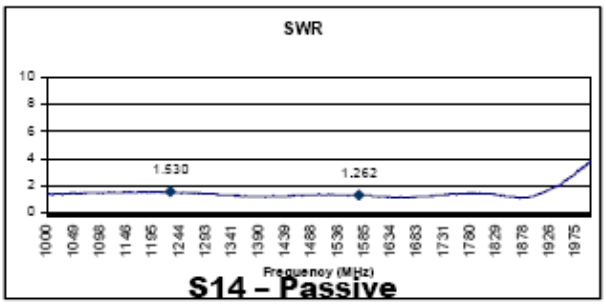


S14 Active - Hi Isolation



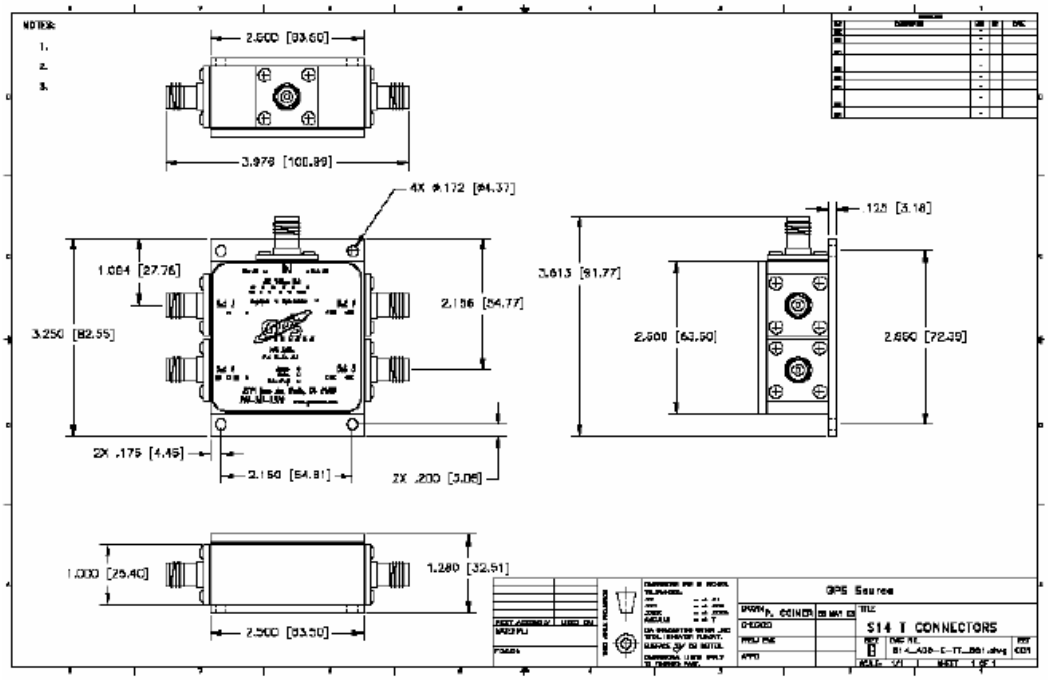




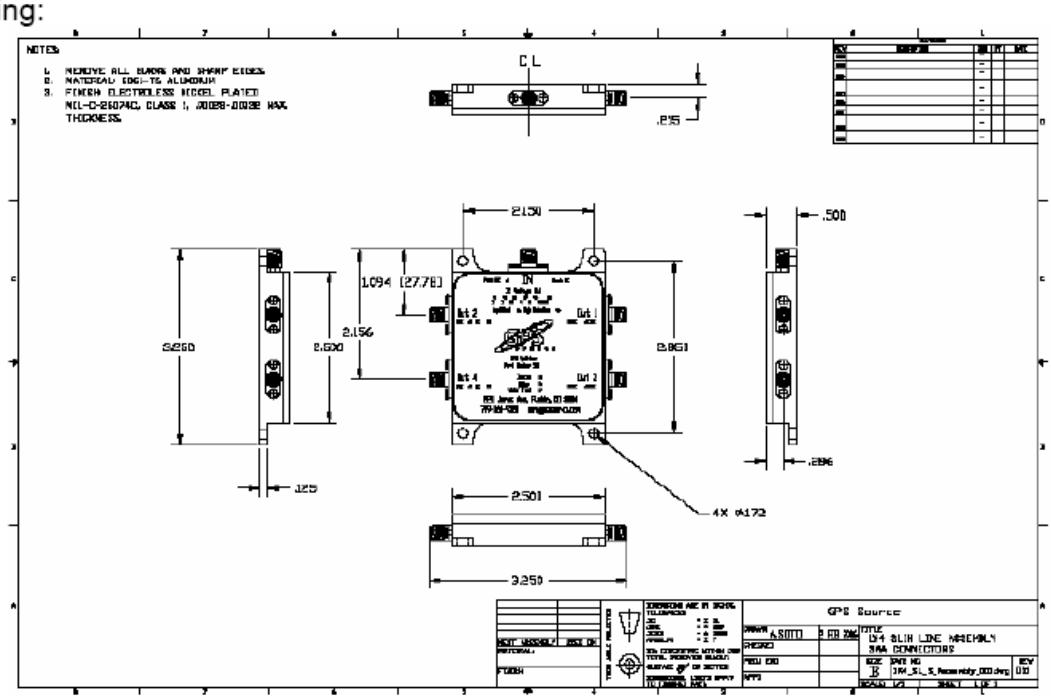


S14 – Passive

Standard Housing:



Slimline Housing:



5.4 L1A

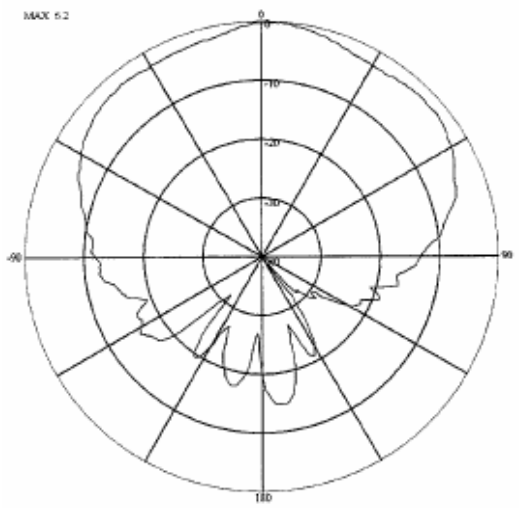
Electrical Specifications, Operating Temperature -40 to 85°C

Parameter	Conditions	Min	Typ	Max	Units
Frequency Range: (Passband)	Ant – Output, VDC = 3 to 16V, Output = 50Ω	1570	1575	1580	MHz
Out Imped.			50		Ω
Gain Element: LNA	 Ant Element LNA, VDC = 3 to 16V, Output =50Ω	 33	 3 35	 3.5 36	 dBiC dB
Output SWR	VDC = 3 to 16V, Output = 50Ω			2.5:1	-
Noise Figure	VDC = 3 to 16V, Output = 50Ω		0.8	1.0	dB
Selectivity +/- 50MHz +/- 100MHz	Ant – Output, VDC = 3 to 16V, Output = 50Ω	 -22 -34	 -24 -35	 -25 -37	 dB
Req. DC Input V.	DC Input on RF Output Center Conductor	3		16	VDC
Current-Amplified	Amplifier Current Draw, DC Input		17	20	mA
Polarization	Right Hand Circular				

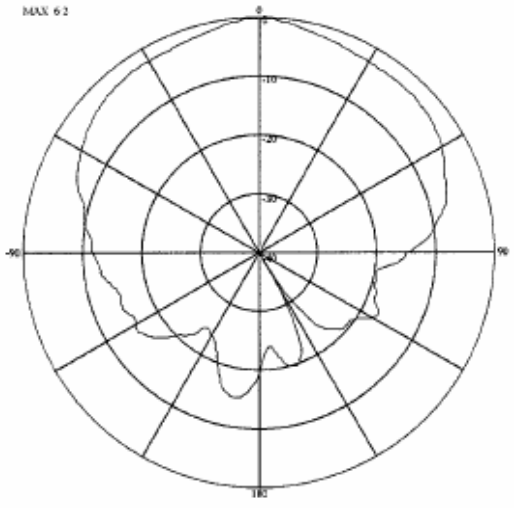
Performance Data:

Far Field Patterns – 1575 MHz

Rotating Linear – (E Cut)

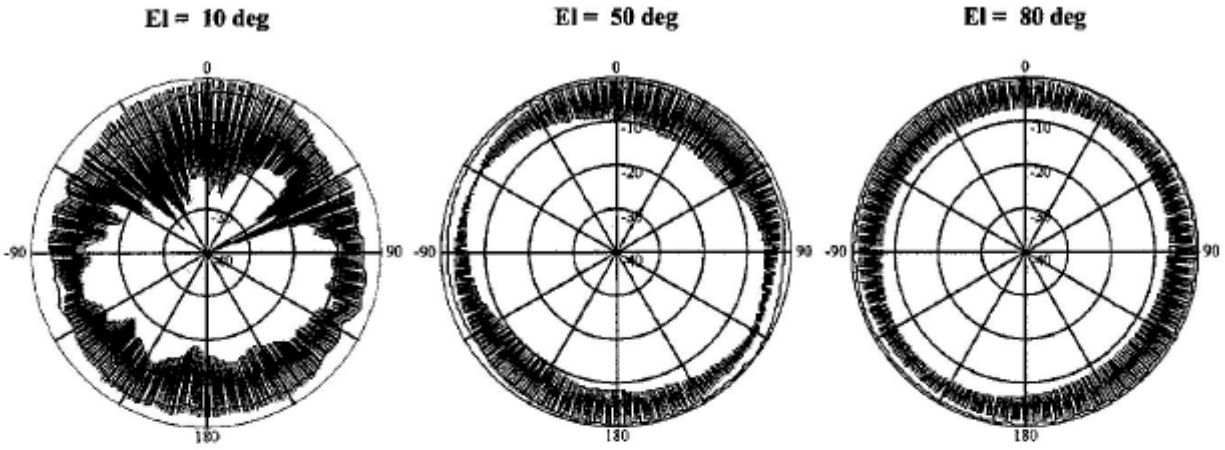


Rotating Linear – (H Cut)

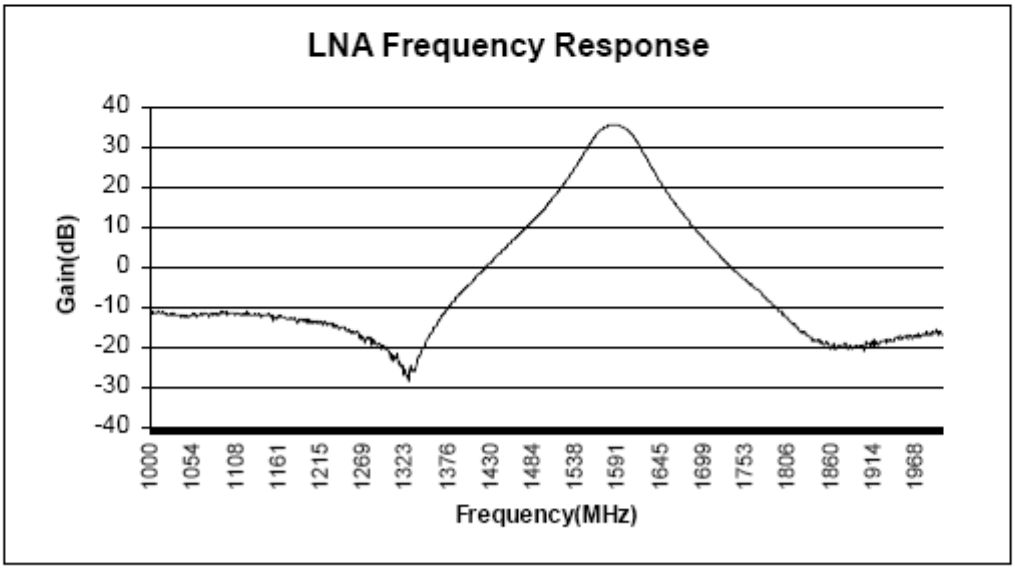


Far Field Patterns – 1575 MHz

Azimuth Cuts:



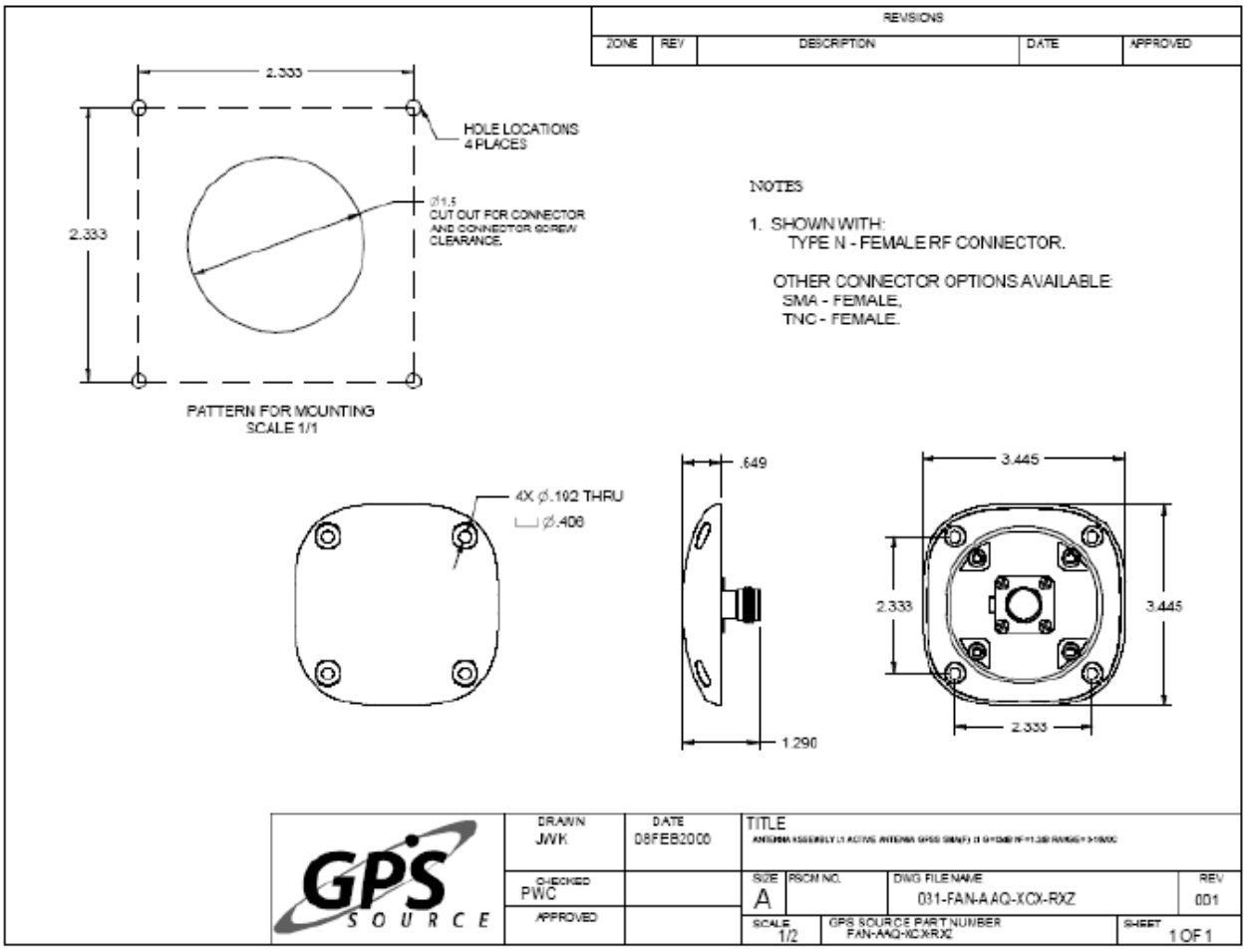
LNA Frequency Response



Notes:

Frequency selectivity of antenna element adds additional out of band rejection.

Mechanical:



5.5 TIMING 3000

Timing 3000 Antenna

General Description:

The Timing 3000 is a 100% form, fit, function replacement for the original Motorola Timing2000 GPS Antenna.

- Dual Pole Filter 40dB minimum at +/- 50MHz
- Rugged N Style Coaxial Connector
- Mounts with optional Right Angle Bracket or Pipe Adaptor
- Designed for fixed mount Precision Timing and Network Syncronization
- 25 dB Gain Typical

General Characteristics:

Parameter	Value
Operating Frequency:	1575.42 MHz, +/-2 MHz
Input Impedances:	50 Ohm
VSWR:	1.5 (typical)
Bandwidth:	25 MHz (typical) +/- 3dB points
Polarization:	Right Hand Circular
Azimuth Coverage:	360°
Elevation Coverage:	0° to 90°
Gain Characteristics of Antenna Element:	+2.0 dBic minimum at zenith -10 dBic minimum at 0° elevation
Filtering:	40dB minimum @ +/-50 MHz
LNA Gain:	25dB (typical)
Noise Figure:	1.5dB (typical)
Dynamics:	Vibration: SAE J1455

Electrical Characteristics:

Parameter	Value
Power Requirements:	5 +/- 0.25 Vdc
Power Consumption:	26mA @ 5 Vdc (typical)

Physical Characteristics:

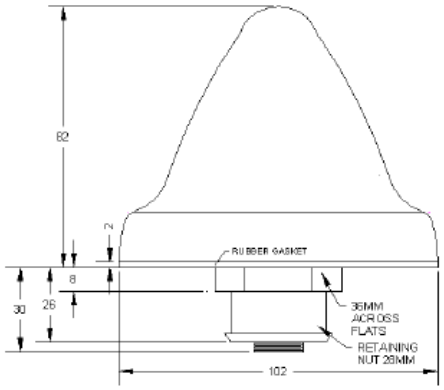
Parameter	Value
Dimensions:	102 diameter x 82 height (mm)
Weight:	312 grams
Mount:	Center mount (M28 nut)
Connector:	N-Connector (jack style)

Environmental Specifications:

Parameter	Value
Operating Temperature Range:	-40° C to +85° C
Storage Temperature Range:	-40° C to +100° C
Humidity:	95% noncondensing
UV Radiation:	JIS D0202 (Sunshine Carbon Arc System)
Salt Spray Test:	Spray 5% NaCl solvent at 35°C
Immersion Test:	1 meter (with connector sealed)
Transient Voltage Test:	+/- 12 kV

Note: All performance measurements are typical and referenced to 25°C unless indicated otherwise.

Dimensional Drawing:



Ordering Information:

Part Number	Configuration
10001724	with N connector

Accessories:

Part Number	Configuration
10001725	Right angle mount bracket
10001511-1	Converts M28x1 to 3/4in NPT & 1-14 Marine
10001511-0	Converts M28x1 to 1.0 in I.D. with setscrew

6. 室外天线安装指导

6.1 天台中间；

在天台的某个不受遮挡的平面上，竖起一个固定座，在固定座上安装天线，这可以获得最好的接收性能。

6.2 天台的护栏边沿或直接固定在墙壁上

图表 3

6.4 天线的避雷措施

室外天线一般安装在楼体防雷的保护范围内。如果天线高出了或则不在防雷保护范围内，需要架设避雷针。

避雷针如图所示，避雷针的高度根据天线的安装位置而定，高度要远远高于天线（高出 0.5~1 米或以上），避雷针需要与楼体的避雷线路充分焊接，保证接地电阻小于 10 欧姆。可以直接用粗铁片将避雷针（铁柱子）焊接到建筑物的避雷地。

声明：避雷是个重要而谨慎的学科，本公司仅提供建议，用户需要找专业的有认证资质的企业设计和实施防雷措施。

图表 4

图表 5

7. A11-Z/A11XLV 的安装

7．1 A11-Z 的安装

7．1．1 在天花板上安装

在需要覆盖信号的区域正上方安装，这可以获得最好的信号覆盖效果。

图表 6

7．1．2 在墙壁上安装

这可以获得较大范围的覆盖

图表 7

7.2 A11XLV-Z 的安装

7.2.1 A11XLV 的连接示意图

GPS转发器连接示意图

图表 8

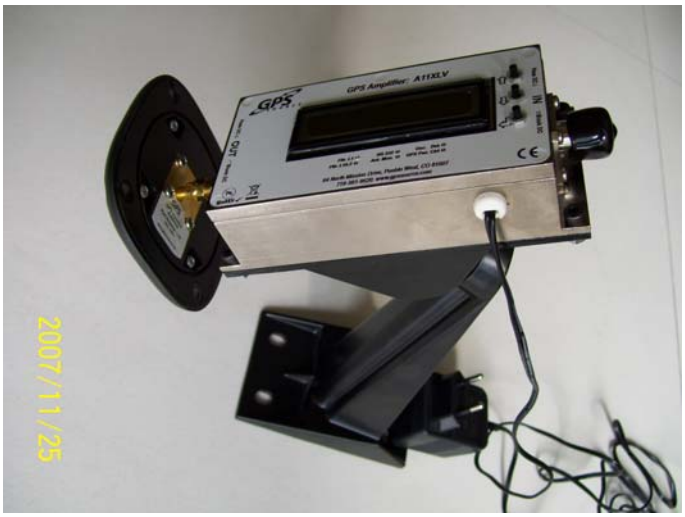
7.2.2 直接安装在墙体上

图表 9

7.2.3 通过支架固定在墙体上

图表 10

7.2.4 通过支架固定在桌子上



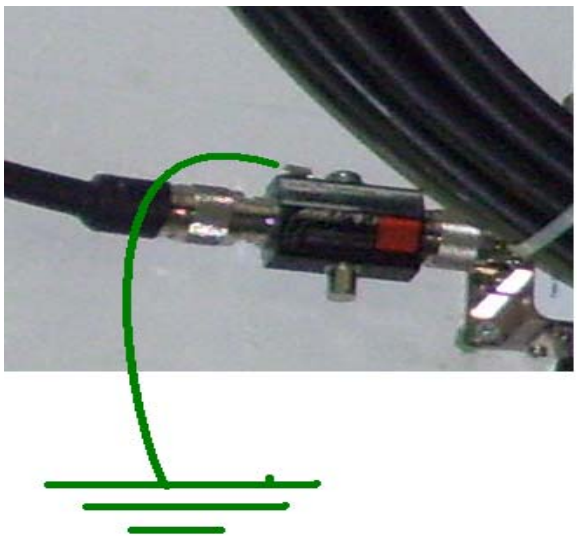
图表 11

8. 避雷器的安装

8．1 室内避雷器的安装

将一根避雷电线焊接到避雷器的接地耳朵，然后将避雷电线充分焊接到最接近的楼体地线，需要保证接地电阻小于 10 欧姆。

避雷器一般安装在室外电缆与室内第一个连接的设备之间。



图表 12

9. 日常维护和使用

9．1 电源管理

9.1.1 系统的电源控制

- 系统的中央供电由 S14-Z 提供。
  该开关控制整个转发系统的电源，同时，L1A 的电源由 S14-Z 供电，系统一旦上电，L1A 和 S14-Z 自动上电并开始工作。
- 转发器的电源由各自独立的电源进行供电。

9.1.2 系统启动和关闭流程：

启动：打开中央供电，分别打开各个转发器的电源。
关闭：关闭中央供电，分别关闭各个转发器的电源。

9.1.3 系统的增益控制

9.1.3.1 A11XLV 上的增益控制：

请参考：A11XLV USERMANUAL

9.1.3.2 A11-V/ GPSRKL1 上的增益控制：

系统的增益控制在每个 REPEATER 上控制，每个 REPEATER 的增益控制范围：0～30dB。如图表 14 所示。

图表 13

9.2 系统性能的例行检查

记录内容：

测试时间
C/No(最大 4 个的平均值),
TTFF
SVs

10 附件：

产品的测试报告。